Utah State Board of Education
Utah Schools Information Management System (USIMS)

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Summary

This document seeks to detail the need for and capture of high-level requirements for a new application to subsume all legacy data collections, reporting applications, and reports in use at the Utah State Board of Education (USBE). For the purposes of this effort, the application will be referred to as the *Utah Schools Information Management System* (USIMS). The USIMS project will incorporate data collections and reporting requirements for all existing Federal, State and local regulations, and USBE Board rules. In addition, USIMS will include the creation of a public-facing user web portal, oriented toward the USBE, Local Education Agencies (LEAs), Educators, Parents, and Students. The estimated time for completion of the USIMS project is approximately 3.5 years at a cost of $22.9 million. The Utah State Legislature appropriated $5.7 million towards this purpose during the 2018 legislative session. This makes the remaining appropriation of one-time funding at $17.2 million necessary for completion of this project over a 3.5-year period.

Background and Justification

USBE is responsible for collecting, processing, providing oversight, and reporting on education data for 652,458 students, and 36,560 educators. USBE is also responsible for reconciliation and disbursement of the State of Utah's second largest budget, approximately $4 billion in funding for 156 LEAs in direct support of students and Educators. USBE manages data for LEA funding reconciliation and disbursement, reporting, and oversight through over 28 LEA to USBE systems.

For years, USBE's legacy systems development and modification has been performed on an ad hoc basis lacking a singular architectural design or vision beneficial to 21st century USBE data collection and reporting systems growth. Legacy systems integration and interoperability inadequacies have resulted in unnecessary USBE staff efforts to cleanse and scrub data to ensure compliance with Federal, State, and local directives. Loss of USBE staff time on data cleansing and scrubbing efforts has left little time for analyzing and interpreting data to assist LEAs with student achievement success.

A new re-envisioned USBE architecture/system for data collection is needed to meet USBEs 21st century data collection and reporting needs. Development of a new USBE data collection and reporting system designed around a singular architectural design, future growth, flexibility, collaboration, and industry best practices will increase productivity, return lost time to UBSE staff, prevent costly errors, and eliminate wasted resources. Most importantly, a new system will provide educators and counselors accurate and timely data to improve student performance, administrator's seamless data to effectively and efficiently manage educators and school resources, and policymaker's quality data to evaluate student achievement success of implemented initiatives.

Objectives

System Design

The USIMS design presented below, seeks to re-establish USBE's core data collections and reporting capabilities by focusing on USBE's key data collections and reporting objects of educators, students, and Finance, which consists of LEAs and Schools and their attributes, and relationships. The USIMS design contains two major elements, a web-based portal frontend and a data collection/presentation backend.

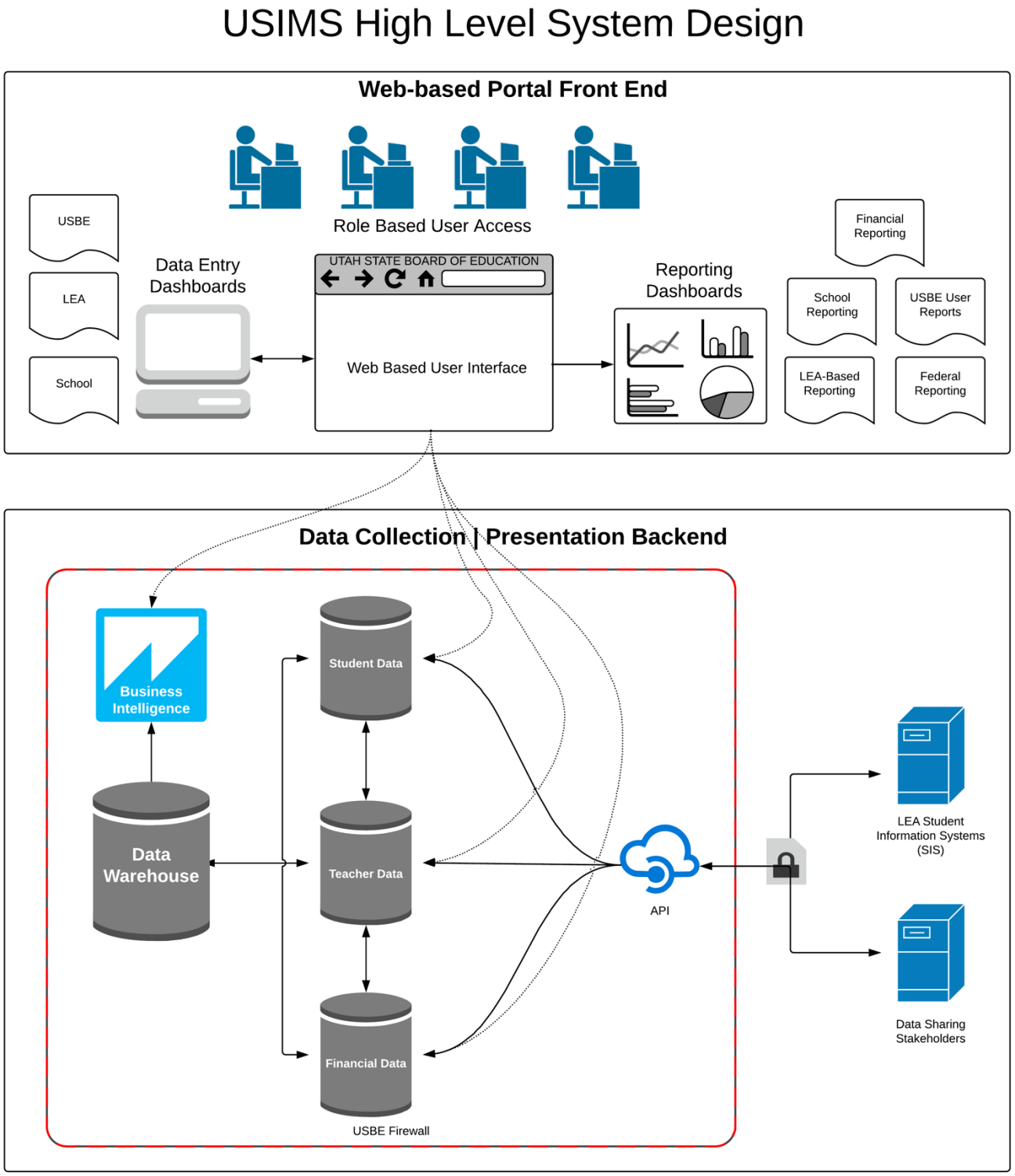

Figure 1 – HIGH LEVEL SYSTEM DESIGN

Web-based Portal Frontend

The web-based user portal frontend will be accessible by all stakeholders – students, parents, educators and USBE users; and will contain data and reporting capabilities, dashboards, data history, user search history, and

other functional capabilities. Each user will be given a username and password and granted access through user roles to only USBE specified and authorized data sets, reports, and capabilities.

Data Collection/Presentation Backend
The data collection/presentation backend will be built utilizing entity relationships. The entity relationship construct permits USBE to reorganize its data collections and reporting system infrastructure to ensure future USBE data collections, and reporting systems agility. The entity relationship construct also provides the opportunity to seamlessly correlate data and generate reports through a business intelligence tool to provide such capabilities as and not limited to:

- connect school performance to spending;
- connect school performance to employment;
- connect educators to student's long-term performance trends;
- connect LEA or school performance to implemented programs; and
- perform financial calculations/determinations based on Federal, or Legislative funding eligibility criteria.

High Level Business Requirements
USIMS will be designed to collect information from primarily LEA SIS's on three objects within USBE: students, educators, and finance, which consists of LEAs and schools, with flexibility for future object addition. USBE will create functional capabilities (reports, data collections, and other data related capabilities such as licensure and certification management etc.), as needed.

Student data will have the following general attributes:
- A unique student identification number which operates as the primary identifier across the USIMS data collection/presentation backend;
- Student and parent/guardian contact information, student impairment(s), and/or disabilities information;
- Federal or state program(s) participation relating to the student;
- Assessment information including test scores, grades, and other pertinent attributes;
- Enrollments and attendance;
- Student demographics; and
- Course history and grades.

Educator data will have the following general attributes:
- A unique educator identification number which operates as the primary identifier across USIMS data collection/presentation backend;
- Educator contact information;
- Impairments and/or disabilities;
- Career and educational information to include special licensure and endorsement information;
- Federal or state program(s) participation relating to the educator;
- LEA/school assignment and history;
- Licensure;
- Endorsements; and
- Background check.

Financial data "LEA/School objects" will have the following general attributes:
- LEA information including schools, school characteristics, assessments, and other elements that are used for payments and reimbursements;
- Federal or state program information used to drive payments to schools/LEAs; and

- Elements from educator data and student data necessary for specific types of transactions related to each.

The Data Warehouse will have the following general attributes:

- Elements of student data necessary for reporting and dashboards;
- Elements of educator data necessary for reporting and dashboards;
- Elements of financial data necessary for reporting and dashboards; and
- Tables based on elements of each data type specific to a report or dashboard.

USBE business owner involvement will be required to define business rules, test and approve created solutions, and train and communicate changes with LEA, school, and vendor personnel. The USIMS will retain longitudinal data history based on business rules provided by USBE business owners for both functional areas and specific data elements. Users will interact with the USIMS system through the 504 compliant web-based user portal. The web portal will provide data, reporting, and functional capabilities to manage student records, educator records, educator licensure and endorsement information amongst other pertinent capabilities.
The project will follow a software development, test, and production best practice methodology. At a minimum, development and test environments will be built prior to commencement of USIMS development. All events, system outputs, reports, user system access, transactions or any other application event will produce auditable logs that will be maintained based on retention requirements defined by the USBE. Needed systemic data deletion will be made through codified events based on quarterly or annual requirements specific to the data or event in question as defined by the USBE, State, or Federal requirements.

Acquisition Course of Action (COA)

Several procurement options have been explored by USBE IT staff. USBE IT staff weighed future systems sustainment, development flexibility/local control, systems implementation time, and potential cost in review of possible procurement options. It was ultimately determined that development provided by in-house resources supplemented with contracted assist and advisory development resources was in the best interest of USBE.
This course of action best suits USBE's future systems sustainment, development flexibility/local control, and potential cost needs. It provides the ability for maturity and commoditization of available COTS solutions and the flexibility for controlled integration with LEA solutions (built-in compatibility). Since USBE controls development, USBE will have full access to code and flexibility in architectural design decisions to meet Federal, State, and/or Board requirements. In house development also provides USBE the opportunity to reduce cost of customization using blended internal and contractor hires versus a vendor with subject matter experts (SME), and provides USBE the ability to seamlessly transition from acquisition to sustainment operations without significant investment.

While system implementation time might be impacted vs procuring a pure COTS solution or a contract developed solution, there is no significant benefit to pursuing either. A COTS solution is not feasible for USBE dynamic data collection business operations, and contract developed solutions present time and cost related risks from poorly developed requirements and/or detailed upfront requirements capture and tedious procurement processes.

Cost Estimate and Timeline

Cost Estimate

USIMS acquisition cost estimates without hardware or additional architecture total roughly $17.2 million at an average cost of $5.7 million per year. Cost for the project acquisition is expected to peak in year two to $9.8 million and drastically subside entering year four to $1.4 million with further expected decreases as contract

personnel supporting existing systems are transitioned out from anticipated legacy systems decommissioning. Hardware is estimated from $3 million to $5 million for the USIMS infrastructure to include new servers, switches, network and support infrastructure bringing the total cost of the project to roughly $22.9 million over 3.5 years.

Projected Timeline

The project will run over a period of 3.5 years and will be completed over 13 activities.

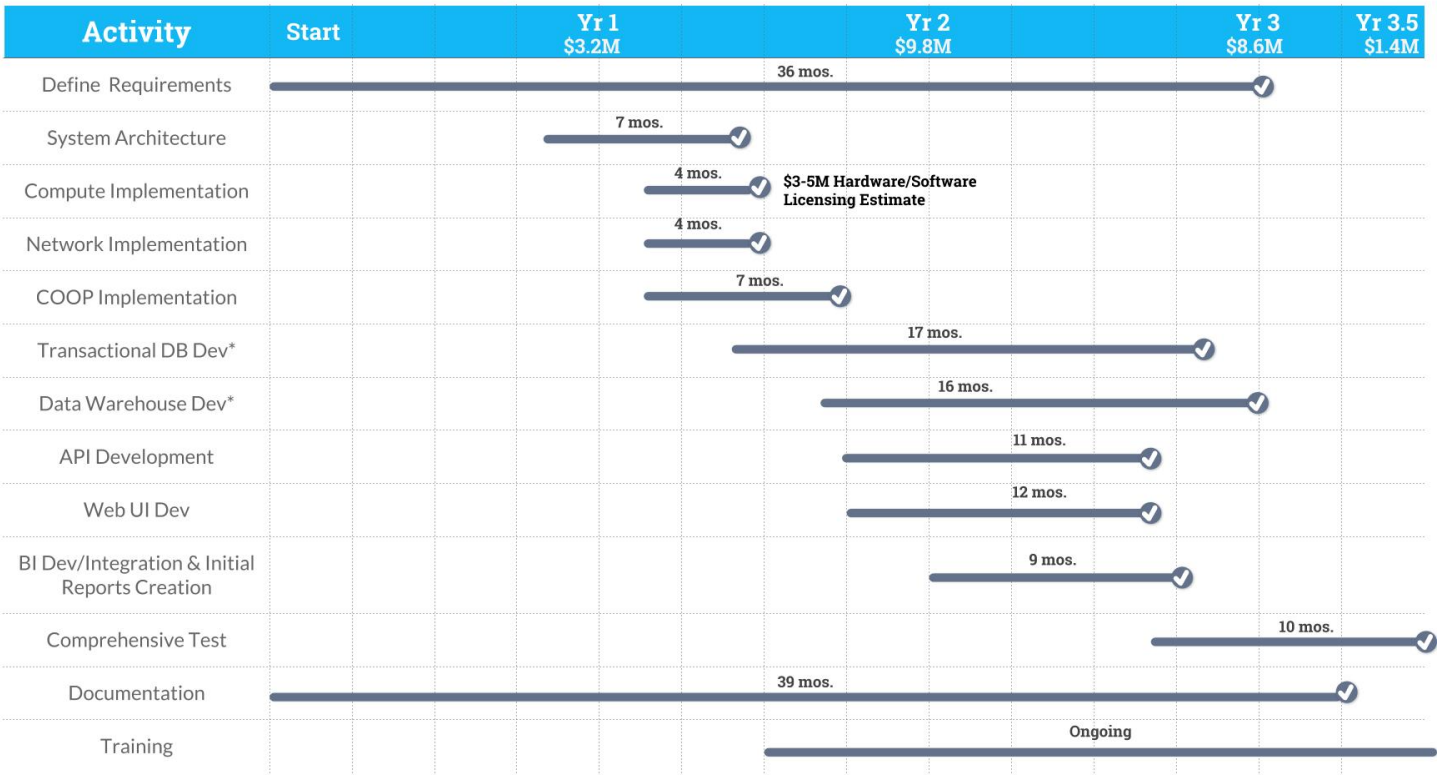

Figure 2- Figure 1 – PROJECTED TIMELINE

** Activity includes data migration*

Project Staffing

USBE IT will use a blend of in-house and contracted staff to complete the USIMS project. Augmented IT staff will be utilized to retain systemic institutional knowledge, application history, and to ensure positive USIMS project sustainment hand off.

USBE IT staff augmentation is balanced with the needs of legacy USBE systems sustainment. USBE IT contractor backfills will be required throughout the project to ensure continued legacy system operations during project duration. Some work needs to be done in identifying which specific staff from the legacy USBE systems would be used to fulfill the needs of USIMS. Below you will find specific expertise types needed to perform the project.

USIMS Team Roles

Role	Responsibility
Senior Program Manager	The senior program manager (SPM) will oversee and direct the project team comprised of current USBE and contractual personnel. Responsibilities include overall project

	governance and direction and implementing course corrections as needed. Duties shall focus on project monitoring, control, team integration, change integration, and corrective action as needed.
Project Manager	The project manager is the individual responsible for delivering the project. The individual leads and manages the project team, with authority and responsibility from the SPM to run the project on a day-to-day basis. The project manager will be the interface between the project and the business.
Solutions Architect	The solutions architect will work with the USBE technology team to design and develop an advanced data infrastructure. The solutions architect will be responsible for the development of the technology solutions and mapping the business requirements to systems/technical requirements.
Software Developer	The software developer will participate in programming activities, monitor, and evaluate system performance, and design and implement new programs and features based on business requirements.
QA Engineer	The Quality Assurance (QA) engineer is responsible for ensuring software quality through the development and execution of software test plans by way of verification procedures based upon software and system specifications.
Information Assurance Engineer	The Information Assurance (IA) Engineer will identify overall security requirements for the proper handling of USBE data and assist the solution architect and software developers in the identification and implementation of appropriate information security. The IA engineer will enforce the design and implementation of trusted relationships among external systems and architectures.
Database Architect (IT Operations)	The database architect will define structure, integrate, govern, store, describe, model, and maintain data in the enterprise for accuracy and usage.
Network Engineer (IT Operations)	The network engineer will design, engineer and implement a new data center network to support the requirements of the USIMS.
Business Process Analyst	The Business Process Analysts will analyze the USBE business processes and workflows with the objective of finding out how they may be improved or automated as part of the USIMS requirements gathering process. They will be involved in documenting procedures and presenting new process designs to stakeholders for discussion and implementation.
Technical Writer	The technical writer will drive the creation of the USIMS documentation methodology and framework and maintain a proper methodology for purposes of consistency and efficiency. The technical writer will plan, write and maintain the USIMS system and user support documentation efforts, including online help screen.

High Level Project Execution Plan

Technical Development Process
An iterative and incremental agile development process will be used in the development of the USIMS. Feedback will be used from each iteration to improve the next. The first iteration will focus on basic functionality of the application.

Project Activities

Activity 1 – Requirements
This activity will define, analyze, and document the fundamental business need for the USIMS product. Product requirements documents will be written in plain language to describe the services that the product must deliver. The product will be described from a user's perspective and will be built based upon inputs from USBE business owners, and Board, State, and Federal requirements as well as interviews from product users. Additionally, policy and legislative directive considerations, and changes will be addressed during this activity with the respective USBE business owners.

Activity 2 – System Architecture Design
This activity will define and document architectural design standards, system and development naming conventions, performance considerations, and systems security/systems integrity goals for all USIMS development activities. USIMS standards and goals will be designed to meet or exceed product requirements considerations and needs. This includes an in-depth analysis and documentation of the desired student, teacher, LEA/school entity relationship model vital to future USBE data collections and reporting agility. This activity also includes the design of a Continuity of Operations Plan to continue functions should unforeseen disruptions occur.

Activity 3 & 4 – Compute and Network Implementation
Procurement and implementation of computing and network infrastructure needed to adequately support the USIMS architecture and architectural performance needs. This activity includes investigating vendor offerings, selecting specific technologies, and performing integration required to make sure hardware and software solutions work together. This activity also includes conducting prerelease testing to ensure required USIMS confidentiality, integrity, and availability considerations are met.

Activity 5 – Continuity of Operations Plan (COOP) Implementation
This activity consists of construction and testing of network and compute infrastructure to ensure USBE's continued performance of essential data collections and reporting functions should unforeseen disruptions or circumstances occur.

Activity 6 & 7 – Transactional Database and Data Warehouse Development
This activity consists of construction of the data model, transactional databases and data warehouse development, linking of the transactional databases to the data warehouse, and migration/transformation of existing data to the data warehouse. Business rules will be developed for the retention of data at various levels of detail.

Activity 8 – Application Programing Interface (API) Development
This activity consists of development of system interfaces to allow the exchange of data between the USIMS and other external data systems to accommodate USBE data and reporting needs. Specific interfaces will be created to support SIS data exchanges, assessment data exchanges, USHE eTranscript needs, and other pertinent USBE and partner data exchanges.

Activity 9 – Web User Interface (UI) Development
Portal development will include creation of a role-based user authentication mechanism with secure and strict permissions-based connections to USIMS data sets and functional needs. Development will include customizable dashboards, reporting spaces, and data submissions pages for teacher licensure and certification management. Other functional capabilities will be developed based on submitted requirements for the USBE, LEA and school administration, parent, and student use of the USIMS.

Activity 10 – Business Intelligence (BI) Integration and Initial Reports Creation
This activity consists of the implementation/integration of a 3rd party BI data visualization tool accessed through the USIMS web portal. Activity will integrate the BI tool in to the USIMS data collection/presentation backend. A common set of agency reports will be developed and made available through the web user portal. Additionally, a functional space for ad hoc BI reporting and data visualization will be developed.

Activity 11 – Comprehensive Test
The end of each development activity will result in a functional test by USBE staff. A comprehensive data collection, reporting, and web portal functionality test will need to be performed prior to USIMS production release. Comprehensive test consists of data submission by a select group of LEAs. The group of LEAs selected for USIMS data submissions testing will consist of a healthy cross-section of existing SIS used across the State of Utah. Of the LEAs selected, a select group of USBE staff, LEAs administration, teachers, parents, and students will be selected to test USIMS features and capabilities.

Activity 12 – Documentation
Development and capture of requirements, team design and development standards, software user manuals, software operations manuals, training documentation, and architectural documentation will be performed by technical writing staff throughout the lifecycle of the system.

Activity 13 – Stakeholder Onboarding and Training
This activity consists of final onboarding and training of internal and external stakeholders into the full production USIMS system. Online and in-person training resources will be created and administered to all Users.

Abbreviations and Acronyms

API — Application Programing Interface

BI — Business Intelligence

COA — Course of Action

COOP — Continuity of Operations Plan

COTS — Commercial Off the Shelf

DOH — Utah Department of Health

DTS — Utah Department of Technology Services

eREP — electronic Resource and Eligibility Product

IA — Information Assurance

LEA — Local Education Agency

MMCS — Medicaid Managed Care Services

MVC — Model View Controller

PHP —Hypertext Preprocessor

PRISM — Provider Reimbursement Information System

QA — Quality Assurance

RFP — Request for Proposal

ROM — Rough Order of Magnitude

USIMS — School Data Collection and Reporting System

SIS — Student Information System

SME —Subject Matter Expert

UDRC —Utah Data Research Center

USBE —Utah State Board of Education

USHE —Utah System of Higher Education

SP—Special Publication